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ABSTRACT

One recent goal of the British Higher Education Funding Council has been to find ways to use technology to cope with the increasing size and diversity of the student population. A development team at the University of Edinburgh (Scotland) received a grant to investigate how technology might be used to identify and help students put at risk by their deficient study skills. This report describes the development of software designed to that end. One piece, "StudentView," became a series of scoring formulas which allow users who have no background in educational research or statistics to compare students. A package of student-centered software called "Personalized Advice on Study Skills" (PASS) has a questionnaire component for self-testing and a "StudyAdvisor" component that is able to offer study suggestions tailored to the individual. Advice deals not only with academic endeavors like essay writing, oral presentations, and group projects, but also with stress and other outside influences on successful studying and time management. Suggestions can be applied by students whose approaches to learning vary from deep to surface to strategic. Although some terminology may be unfamiliar to students in the United States, the software content may be useful in American settings. Some sample text from "StudyAdvisor" is appended. (Contains 10 references and 6 figures.) (BEW)

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ED 394 510

35.45 Demonstrations in Higher Education, 8:15-9:45, Sheraton, Riverside Ballroom, 3rd

Personalized Advice on Study Skills

A Computer-Based System to Help University Students and Staff

Carol A. Speth
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Introduction

In 1992, the British Higher Education Funding Council began Phase I of the Teaching and Learning Technology Program. One goal of TLTP was to develop new ways to use technology to cope with the increasing size and diversity of the student population, at a time when the number of staff members is stable or, at some institutions, being cut. One of the grants was awarded to the Center for Research on Learning and Instruction (CRLI), at the University of Edinburgh.

A development team there began a project to use research and computer technology to identify university students (especially those in the first year) likely to fail or drop out because of deficient study skills. CRLI had been conducting research on student learning for several years. In a study with electrical engineering students, Entwistle et al. (1989) found that certain study skills were related to poor performance or failure in the first year at the university. As part of a study of the transition to higher education for Scottish secondary school students, Wall et al. (1991) interviewed secondary school personnel in Scotland and found that they believed it was their duty to help students learn the content necessary to prepare for the qualifying exams (called "Highers" in Scotland and "A Levels" in England and Wales), not to help them learn all the skills they would need once they were in higher education. University staff, on the other hand, believed it was their duty to teach subjects, not necessarily to teach students the skills they needed to survive in higher education. They believed skill development was the job of the secondary schools, or of the students themselves. Wall et al. (1991) reported that many Scottish students felt they had entered higher education with inadequate study skills, and that higher education institutions made little effort to help them.

The situation in Scotland is complicated by the fact that, having passed their Highers, many students go to higher education after only five years of secondary school, so they are only 17 years old. Some stay out of school a year and then go to the university, while others choose to stay in secondary school one additional year and do courses which are specifically designed to make them more autonomous learners. In any case, it is asking a great deal of 17- or 18-year-olds, who have just been successful in secondary school and on their qualifying examinations, to be able to diagnose their own weaknesses in a new environment, with higher expectations, less individual help, and less frequent assessment.

These problems and the reluctance of both secondary and post-secondary educators to accept responsibility for solving them, are not unique to Scotland or England. So the software and support materials described here should be of interest to post-secondary educators in many countries. British universities are faced with larger enrollments, bigger classes, less contact time, more ethnic and socio-economic class diversity, and more non-traditional age students. Systems are being developed to make it easier to transfer credits. There is increasing pressure on young people to acquire educational qualifications in order to compete in the job market. Fortunately for students, more institutions are being upgraded into universities and competing for their tuition money. Meanwhile, grants are being cut, so that students and their parents pay an increasing proportion of the cost of post-secondary education. Conservative government policy includes

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considering dropout rates as one factor in decisions about how much funding various universities receive. Taken together, all these trends lend support to the notion that students are customers who have rights, including the right to take their business elsewhere.

Purposes behind the grant proposal

In this project, one of the means for identifying study skills deficiencies was an instrument called the **Approaches to Studying Inventory (ASI)**, which had been developed at the University Edinburgh in Scotland and at the University of Lancaster in England (Entwistle & Ramsden, 1983). The inventory was based on some 25 years of research about how British university students learn, reinforced by studies at various institutions around the world, including the universities of Newcastle (Australia), Melbourne (Australia), Goteborg (Sweden), and Lincoln (Nebraska). At the core of this research is a contrast of several approaches to learning. Some students take a **deep** approach of seeking meaning or understanding, while others take a **surface** approach of trying to memorize just enough information to pass their exams (Marton & Saljo, 1984). Other students use a **strategic** approach, in which they try to get the best possible grades (Ramsden, 1979).

The ASI had been administered, analyzed and revised as part of several research and development projects. But it was not being sold, and there was no updated manual. Educators and researchers in Britain and other countries had found the ASI and its underlying concepts helpful for understanding student learning in a variety of contexts. But every so often, researchers at other universities around the world would ask for help with its scoring and analysis, even though they had used older versions or put the instrument to uses for which it had never been intended.

TLTP was seen as an opportunity to stabilize the instrument and provide a tool for its scoring and analysis. That was the logic behind development of the first piece of software, called *StudentView*. Another intention was to develop a version of the ASI that could be answered interactively at the computer, record the data, and combine results for a group of students. That was called *Questionnaire*. (Figures 1-3 show what students see on the screen while taking *Questionnaire.)*

The ASI was developed in Britain, but some of the progress in developing ways to use the scores was made in the United States. Speth and Brown (1990) used ASI scale scores to sort American university students into groups according to their approaches to studying, then compared these groups in terms of how they thought about preparing for an essay test or a multiple choice test in history. That study made use of cluster analysis, which allowed them to take all scale scores and the relationship among them into account, and resolve cases of ambiguity when two or more scale scores are similar. Whereas Speth and Brown used cluster analysis of scale scores to assign students to groups, subsequent research at the University of Edinburgh refined the instrument and its scoring formulas to eliminate the need for cluster analysis. *StudentView*, allows users with no background in educational research or statistics to compare students visually in terms of their deep, strategic and surface scale scores, in either two-dimensional or three-dimensional space. (Figures 4-5 show each type of graph, with points representing individual students in terms of their scale scores.)

Strategies for achieving the purposes

The proposal stressed helping departments identify students with potential problems fairly early in the academic year, and stimulating them to provide help appropriate to their subject matter and to the kinds of academic demands they were making on their students. But when the first *StudentView* prototype was shown in academic departments at three universities in Edinburgh,

their reaction was to say they would also need guidance to know how to help students. The development team began work on another piece of software to provide advice directly to students.

Finally, the team developed a package of software and printed materials to help institutions both identify and advise students at-risk because of poor study skills. The package was eventually called, PASS for "Personalized Advice on Study Skills." (Figure 6 shows the relationship among the various components of PASS.) Use of the software requires Macintosh computers (System 7 or later) and HyperCard (2.2 or later). Printed materials were developed to guide people who were interested in the concepts but who had no Macintoshes, and for those at institutions with many PC's but few Macintoshes.

Questionnaire allows students to enter their responses directly into a computer, thus eliminating the need for paper questionnaires and manual scoring. However, instructions for scoring paper questionnaires are included. Students' responses are combined to develop an individual profile of strengths and weaknesses, which can be analyzed as part of a group, or loaded directly into *StudyAdvisor*, to give specifically-tailored advice. Or the responses can be merged and loaded into *StudentView* for group analysis. This allows teaching faculty, administrators, advisors or counselors to determine which students seem most in need of help. Instructors can decide for themselves where the cutoff line should be, in other words, what proportion of their students will be urged to seek help. However, if staff members do not want to perform this role, or if students are concerned about having staff members know how they responded, students can by-pass the group analysis, take their profiles directly into *StudyAdvisor* and get the help they need, in confidence. Users can even customize *StudentView* by creating new functions.

The third part of the package, called *StudyAdvisor*, makes use of each student's individual profile to give advice in the areas of need. *StudyAdvisor* can also be used as a "browser," without loading a profile. If students have not taken the *Questionnaire*, or if their needs have changed since then, they can select one of the Key Profiles to screen out irrelevant information. While *StudyAdvisor* was designed to be used by individuals, if time and facilities allow, it is quite useful to have students work on it together in order to facilitate discussion of study strategies. One goal of *StudyAdvisor* is to foster a deep-strategic approach to get satisfactory grades, while still seeking to understand the material and relate it to what they already know.

StudyAdvisor is a HyperCard stack, but special features were added by means of additional programming in HyperTalk. *StudyAdvisor* allows users to mark individual cards and print them as a booklet. Appendix A is a sample page from such a booklet. There is also a notepad which can be saved and printed.. It can be used by students or staff who want to customize the material or draw special attention to particular content.

The structure of *StudyAdvisor* evolved over time. Biggs (1987) indicated that students just coming into higher education might only be able to use advice at the basic level of hints and tips. But as they developed more confidence, they would want detail and examples. In *StudyAdvisor*, practical advice is provided on the basic level or "main track" or "main line." Students who want more detail are encouraged to click on a word in boldface type. These bold links lead them more detailed information, indicated visually by the size of type, which gets smaller as the user goes off on these "sidetracks" or "branch lines."

Students are strongly encouraged to read the introductory material the first time. But students who participated in the formative evaluations said *StudyAdvisor* was something they would want to come back to as their needs for information changed. Being forced to go through all that

orientation material each time was frustrating. So *StudyAdvisor* begins with a fork in the road, one path for newcomers and one for previous users. Choosing the bold word, **Newcomers,** sends them to instruction on **using** *StudyAdvisor;* some research-based material on **becoming** a successful student; a section on **describing** student learning introducing the deep, strategic and surface approaches; and a section on using their own **profiles** generated by *Questionnaire*. After finishing that section, users are directed back to the introduction card, which enables them to go to the list of **Contents.**

The **Contents** represent an inclusive list of tasks that British higher education students might be expected to perform. Clicking on a bold word takes users to a gatekeeper card listing what is covered in that section. If they are using a profile, and if their profile suggested they wanted or needed help with that topic, they can go on to read that section. If not, and they still want to read the material, they can choose to turn off their profiles. The list of topics includes:

- types of university **classes**
- using **resources**: library, technology and people
- organizing study **time**
- **reading**
- learning from **lectures** (this included taking lecture notes)
- getting the most out of **tutorials**
- taking notes from **books**
- writing **essays**
- **practical** classes (another name for laboratory classes)
- **problem** solving
- **oral** presentations
- **group** work
- **field** work
- **project** work
- **revising** for examinations
- sitting **examinations**

Many people told us, "But students fail for many reasons besides poor study skills." So, after the list of academic tasks, a card titled, "Life is not purely academic" introduces a section about other **influences** on successful studying including:

- entry **qualifications** and background knowledge
- how **difficult** you find your coursework
- lack of **direction**
- **commitments** like work, family, etc.
- physical or mental **health,** including **stress** and **depression**

Finding the right voice for *StudyAdvisor* was a job in itself. There is no one right way to go about studying, it is possible to succeed with poor methods and fail with good methods of study. Much of the published study skills advice is actually based on memory research and training. Memory is important in higher education, but it is not nearly enough. The goal of most universities is to help students learn how to think and reason, not merely to remember facts, even though the methods of assessment may not always reinforce that goal. Some study skills books are rather patronizing and preachy in tone, even when there is no research to back up their advice. *StudyAdvisor* offers principled advice, based on research. The tone is intended to sound like an older or more experienced student talking to a novice, or in American terms, a junior or senior talking to a first-

year student, avoiding the word "should" as much as possible. Students are instructed to click on the underlined words to get student quotations, most of which come from interviews of actual students. These popups can even be printed along with the other information on a card.

In *StudyAdvisor*, students are encouraged to: (1) identify the **purpose** for doing the task--both in terms of the student's purpose and the instructor's purpose; (2) choose an appropriate **strategy** which relates to the purpose of the task; and (3) after they finish an assignment, and/or after they receive a grade on it, stop and **reflect** about how satisfied they were with the final product, how long it took in relation to how long they predicted it would take, how well it met the instructor's criteria, and how they would change their strategies if they had to do it again. Only by becoming reflective practitioners of learning and studying can we improve the process and learn from our mistakes. Some of the inspiration for these emphases came from Selmes (1987). Biggs (1985) said that effective learning under institutional, as opposed to laboratory, conditions requires first that students become aware of task demands and of their intentions regarding the task. According to Biggs, the second requirement for effective learning is for students to consciously control their own cognitive processes. This control is called self-regulated learning by some researchers.

Students who use the **strategic** approach often like to speculate about what instructors say they want as opposed to what they really want. Meanwhile, students using a **surface** approach are disadvantaged by taking things at face value and not knowing the rules of the game. *StudyAdvisor* conveys the message that learning tasks in higher education need not be guessing games, that the purpose of an assignment should be clear, and if they do not understand the purpose, it is all right to ask. However, it is in their best interests to phrase the question tactfully. Their instructors should not be angry or offended if their question indicates that they sincerely want to learn what they are supposed to learn, not trying to do the minimum amount of work necessary to pass.

This is one example of how *StudyAdvisor* is intended to empower students and make them better-informed consumers of their educational experience, while indirectly influencing instructors to be clear about their purposes. It may be hard to believe in this age of enlightenment, but there are still instructors who teach as they were taught and give the same assignments that they were given without asking or explaining why. Some critics of our project say it is wrong to try to change students to fit higher education, we ought to concentrate on changing the system so that the goals of instruction and the strategies of assessment match up better. We said that is a wonderful goal, but many students' time, money and prospects in life will be sacrificed long before it is accomplished.

Reflections on the project

StudyAdvisor recommends reflection on educational experiences and working on the project was an educational experience. It was ironic that this grant went to the University of Edinburgh. Staff and administrators there think of their institution as being on a par with Oxford and Cambridge. They believe take only the best-qualified students, or as Jean Brodie (a fictional Edinburgh educator) would say, *la creme de la creme*, so their students have no problem with study skills. A mere handful of people from the University of Edinburgh came to PASS workshops, and some of them came more to check up on us than learn how to use the system. Others were slightly interested, but wanted us to come show it to them, rather than rearranging their schedules to get to the workshops. No one came from Oxford or Cambridge. Staff from less elitist institutions, especially in southern England and the London area, where there is more ethnic diversity, and universities that used to be polytechnics were the most enthusiastic. Some people made nine-hour train journeys, or long flights from the most distant parts of England to get to Edinburgh, and said it was well worth the trip.

Since project funding came through the Scottish Higher Education Funding Council (SHEFC), the products had to be most sensitive to the situation in that country, secondarily to students and institutions in England, Wales and Northern Ireland. Scotland has relatively few racial minority students, so that is not talked about in this version of *StudyAdvisor* or measured by *Questionnaire*. (American versions could incorporate that variable.) But Scottish universities are taking more students, either just out of secondary schools or as returning adult learners, who are the first ones in their family to enter higher education. So *StudyAdvisor* includes information that people with more familiarity with higher education take for granted. Edinburgh University in particular and Scottish universities in general have a high proportion of students who live with their families. So it might be more difficult for them to get advice from peers and older students than if they lived in university housing. *StudyAdvisor* gives some of that sort of advice, but also tells them that such help is worth seeking out for themselves.

British higher education seems to be evolving toward models that Americans would be familiar with in order to cope with similar external and internal pressures. On the PASS project, the three British team members had always lived and worked under the old system of **year-long courses** divided into 10-week terms, often with several different lecturers and a course coordinator. Edinburgh, Oxford, Cambridge, and some of the ancient universities still organize instruction in that way. Working with people at the University of Edinburgh sometimes made me feel like an alien from another planet, not just another country, because our time frames were so out of sync. However, many British universities are switching to a **semester** system, in which a course lasts one semester. The transition to semesters and redefinition of courses into one-semester units they call "**modules,**" has been painful for some teaching staff. (At one university they call this transitional process "S&M.") Coming from American universities, it was easier for me to relate to the needs of staff at these other universities, and they were more useful as collaborators. Although some departments are moving toward more frequent examinations and graded daily work (they call this "continuous assessment"), British universities traditionally relied on course examinations at the end of the year. Assessment consisted of "marking" essays that students had written, outside of class, according to set criteria. Quizzes, unit tests and mid-term exams are not familiar concepts. University staff around Britain are just now discovering computer-scored multiple-choice examinations and item banks, and some are quite excited about them.

Entwistle, Odor and Anderson (1987) had attempted to put the concepts underlying the ASI to use in a Macintosh-based computer simulation to give incoming students a preview of the experience of higher education and show them the implications of various decisions. The idea was promising but the product was not finished. Several years later, Macintosh was again chosen as the first platform for developing the PASS software for TLTP, partly because, when the proposal was written, HyperCard was the only authoring tool that allowed for individualizing instruction according to rules on each card. The decision to program for Macintosh was much criticized, because PC's are even more predominant in Britain than they are in the United States. Many people would rather we had compromised the individualization part and designed for the computers they already had. For example, people at the national Teaching and Learning Technology Project office or those on the TLTP national board never understood why we were designing for Macintosh, and continued to tell us we could have done it just as well using Toolbook or Authorware.

Sadly, that purpose of individualizing instruction in *StudyAdvisor* based on ASI results was compromised anyway, within the development team. The task of personalizing the instruction was difficult enough intellectually, but conflicts of purpose within the project team made it even more difficult. The result was that, after choosing HyperCard to allow individualization, very little use

was made of that capability in this version of *StudyAdvisor* (except the items asking students about their level of confidence with various study skills which are used a great deal, even though the questions, unlike the ASI items are not based on years of research). This is not to say that *StudyAdvisor* is a poor product. Certainly the advice would cause no harm. and participants in formative evaluations, students from first year right through graduate school, nearly all said they learned something useful. Non-traditional age students appreciated it the most. But the goal of personalizing the advice using the approaches to studying was not accomplished in this version.

My mission, to bring the concepts of deep, strategic, and surface approaches to life for students in some way that might help them think differently about their studying led me to develop illustrations for the section called "**describing** student learning." The surface approach is depicted as a student swimming on the surface of the subject matter, defenseless against the sharks (the symbol for assessment) and also missing the treasures below. Students using a strategic approach are depicted as well-equipped scuba divers, very aware of the perils of assessment. But the strategic divers are so focused on defending themselves from the sharks that they completely miss seeing the treasures below them: the pearls of wisdom, the connections among ideas (represented by coral), and the valuable information for long term use (gold coins represent long-term value and transferability).

The deep approach is symbolized by a deep-sea diver. Student with a deep approach intend to go deeply into the subject matter, and they find a wealth of treasures in it. But the deep-sea diver, unarmed and with the weighted boots, the big helmet, and thick suit, does not have much flexibility. Most dangerous of all, being so absorbed with the subject matter leaves this diver defenseless against sharks. So a strategic approach by itself is less dangerous than a deep approach by itself, but less rewarding. Ideally, students would use a combination of the deep and strategic approaches, and that is depicted by a diver avoiding distractions which are symbolized by entangling underwater vegetation, making use of modern technology such as cameras and computers, preparing for assessment in the sense of having a knife strapped to one leg, but not so focused on grades that learning content is secondary. (The illustrations proved that it is possible to use the approaches as part of the instruction, and American versions could gradually pull that content into the stack itself, to make this a personalized system and not one that analyzes data but does not act on it.)

Workshops for users of the software during the last academic year of the project brought some 90 individuals to Edinburgh. Many people were enthusiastic about the package but said they needed a PC version. A proposal was written for continuation funds to convert to SuperCard, which was soon to be available for the PC as well as the Macintosh. But that proposal was not funded. There has been some development toward PC and WWW versions, and you can get updates by email to Velda.McCune@ed.ac.uk. Their temporary Web UR is: http://129.215.172.45/

Right now, only a British version is available from the University of Edinburgh. The British spelling and punctuation will confuse American students, and some of the content needs to be altered slightly for this country. Simple changes to wording, spelling and punctuation can be made fairly soon. For example, the British talk about essays rather than research papers, and these are "marked" not graded. "Tutorials" are a very important part of British higher education, more so than quiz, recitation, or discussion sections here. *StudyAdvisor* includes unfamiliar terms such as "practicals" for laboratory classes, "sitting examinations," "revising" instead of reviewing, and "orientated" instead of oriented, but the language is not as unfamiliar as it might have been without American participation. References to "Highers" and "A-levels" would not be meaningful to students in the United States.

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Your course of action if interested

If you want to purchase the British version as is, you can write to the Centre for Research on Learning and Instruction, University of Edinburgh, 10/12 Buccleuch Place, Edinburgh EH8 9JT; telephone +44 0131 650-4334; fax +44 0131 667-5335; E-mail: lynh@festival.ed.ac.uk. If you are so inclined, you are allowed to customize the software yourself, but not to resell it. I can help you customize a version for your institution, if you pay me for labor rather than buying it as a product. I would be willing to offer training on your site for adequate reimbursement, as I have no income or support whatsoever. My address is: Dr. Carol Speth, 2900 Clinton Street, Lincoln, Nebraska 68503; phone: 402-466-4740.

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Figures

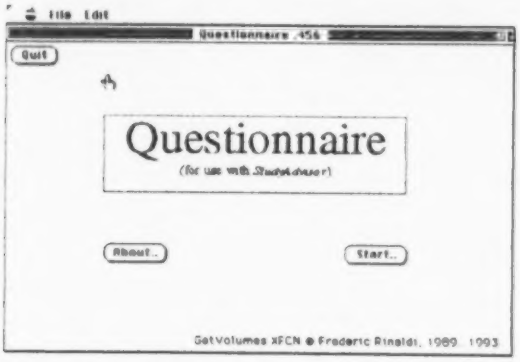

Figure 1: First screen of *Questionnaire*

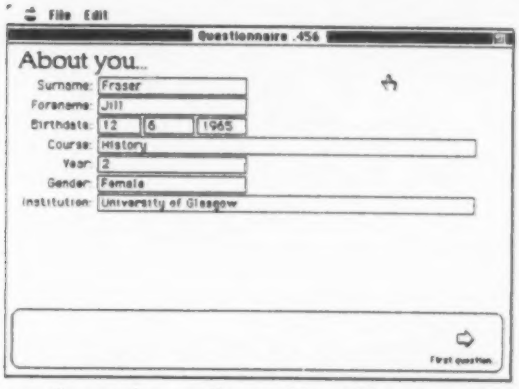

Figure 2: How *Questionnaire* collects identification data for each student

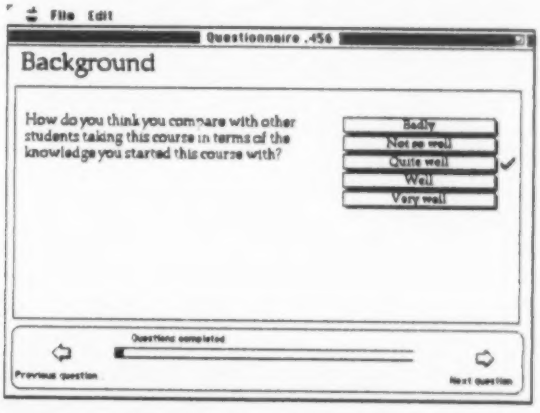

Figure 3: Sample item from *Questionnaire*

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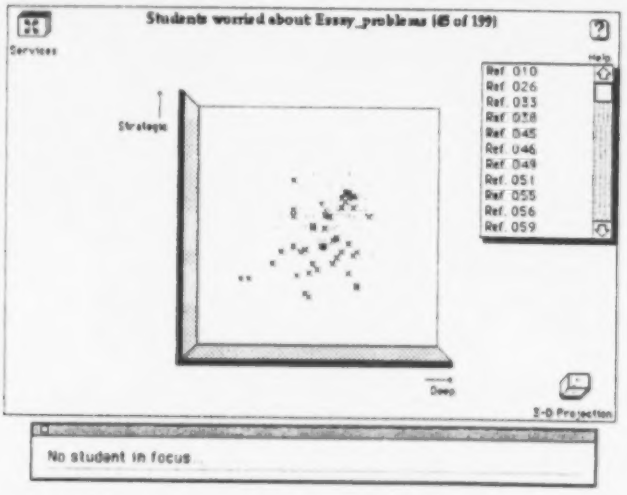

Figure 4: Two-dimensional graph from *StudentView*

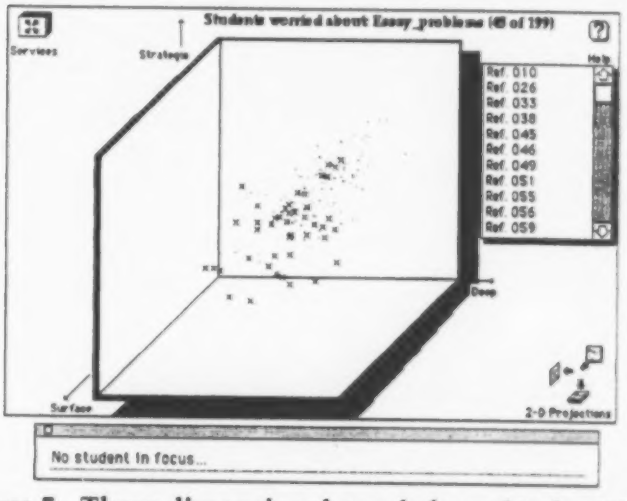

Figure 5: Three dimensional graph from *StudentView*

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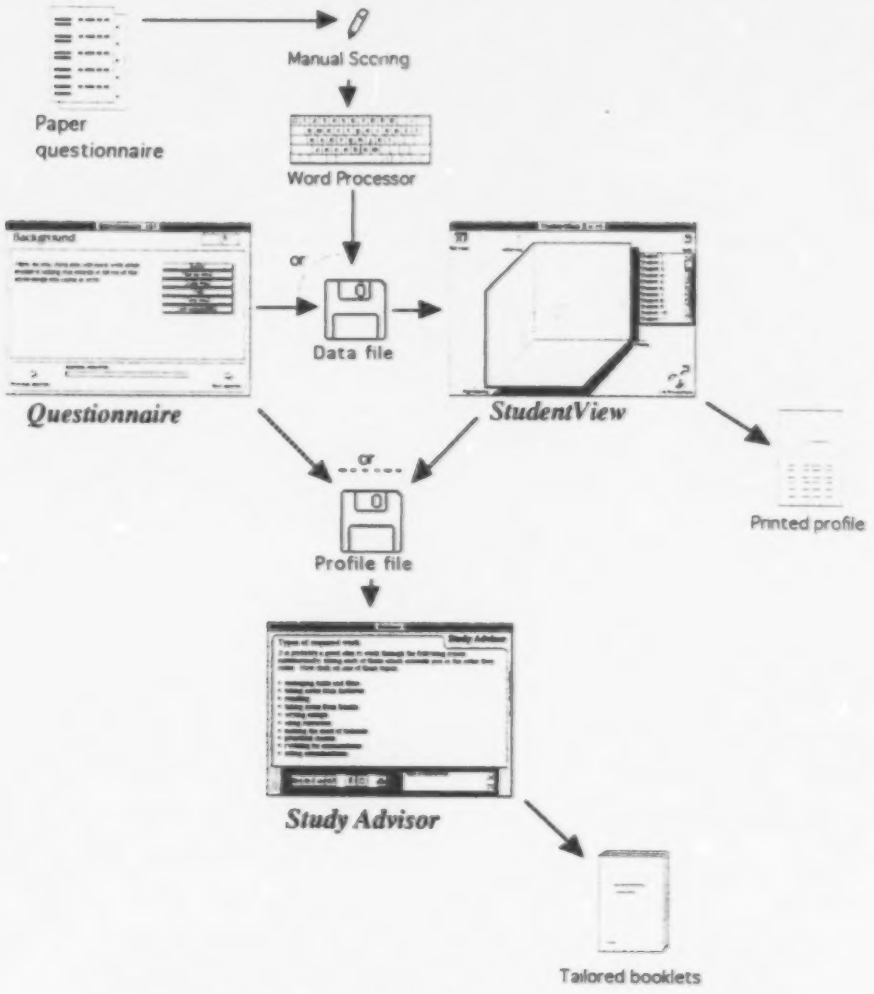

Figure 6: Inter-relationship of PASS components

Appendix A, on the following page, shows one sample page from the booklets that can be printed by marking individual cards in *StudyAdvisor*.

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Working in groups

Most of the things that you will do within groups will be fairly familiar to you and are covered elsewhere in Study Advisor, such as using libraries to gather relevant information, doing a project, writing a report, or giving an oral presentation. Of course, these tasks will vary depending on the nature of the subject.

While the tasks you might be asked to perform as a group are quite familiar, the most difficult challenge is setting up and operating an effective team. We will begin with some general comments and questions about group work, then look at specific steps in the process. This advice will be more useful if your group work lasts for several weeks, but there are some suggestions you can keep in mind even if you are only in the group for a short time.

The work we did in groups really sticks out in my memory. Working together as a successful team is a really important skill that you can transfer to the workplace. But it is very difficult to do well and we did not get many chances.

Group work is not easy

An inexperienced student might assume that 'many hands make light work', therefore it should be quicker and easier to do things as a group than as an individual. Actually, trying to work as a team often makes things seem slower, more difficult and complicated. It is seldom possible to divide the work equally, and people bring such different talents and skills to the task.

Traditionally, higher education encouraged competitiveness and self-reliance, but this is changing. Many occupations require you to work with others at least part of the time, and employers often complain that recent graduates do not know how to work in a team. So developing your skills in group work might be one of the most important things you do at the university, and you should take advantage of opportunities to practise.

Why might group work seem slower?

When you do a project, report or presentation as a group, you do not have to do as many different kinds of tasks. One mistake students often make is to divide up the topic on the basis of very little knowledge or understanding. Then everyone goes their separate ways. Unless you spend a fair amount of time planning and coordinating your work early on, it is extremely easy for your efforts to overlap, while leaving big gaps in coverage. Perhaps worse, different team members approach the topic from opposing points of view, and after it is too late to change tracks you find that, not only do the various contributions not fit together, various team members' ideas are in direct conflict.

How can you avoid these problems?